Mr. Michael T. Davis Algebra II Delta & Eta	Exponential Functions Unit III (2^{nd} half) Test April 23, 2015

Total 85pts

Name: Mr. Davis

2pt 1. WITHOUT a calculator, find 15% of 140. You must show work to receive full credit.

10% of 140 is 14 15% of 140 is 14+7=21
5% of 140 is 7

2pt 2. WITHOUT a calculator, find 400% of 50. You must show work to receive full credit.

$400\% = \frac{400}{100} = 4 \qquad 4(50) = 200$

2pt 3. WITHOUT a calculator, find 1% of 92. You must show work to receive full credit.

For 1% move the decimal place 2 units to the Left
1% of 92 is 0.92

2pt 4. WITHOUT a calculator, find 130% of 50. You must show work to receive full credit.

130% of $50 = 50\%$ of $130 = \frac{1}{2}(130) = 65$

Determine the answers to these questions WITH a calculator. Show work so you get full credit.

4pt 5. The rabbit population on Bunny Island is 6,710 today. If the population over the next year increases by 27.5%, then what will be the size of the population in one year? You must show work to receive full credit.

$6710(1+0.275) \approx 8,555.25 \approx 8,555$ Bunnies

4pt 6. The popular town of Smithville in 2003 was estimated to be 75,000 people with an annual rate of increase of about 3.6%. Write an exponential function to model future growth in Smithville. Use the function to determine the approximate population size in 2012. You must show work to receive full credit.

$f(x) = 75,000(1+0.036)^9 \approx 103,109.6 \approx 103,110$ People

4pt 7. Marisa invests $4,560 in a savings account with an annual interest rate of 4.5%. Write an exponential function to model the future value of the investment. Use the function to determine the value of the investment in 12 years. You must show work to receive full credit.

$f(x) = 4560(1+.045)^x \quad f(12) = 4560(1.045)^{12}$

$\approx \$7,733.22$

4pt 8. Matt bought a new car at a cost of $29,000. The care depreciates approximately 14% of its value per year. Write an exponential function to model the future value of the car. Use the function to determine the approximate value of the car in 11 years. You must show work to receive full credit.

$f(x) = 29,000(1-.14)^x \quad f(11) = 29,000(0.86)^{11}$

$\approx \$5,519.26$

4pt 9. Radium-226, a common isotope of radium, has a half-life of 1620 years. Professor Korbel has a 88 gram sample of radium-226 in his laboratory. Write an exponential function to model this decay. Determine how many grams of this 88-gram sample will remain after 9,720 years. You must show work to receive full credit.

$f(x) = 88\left(\frac{1}{2}\right)^x \quad \frac{9720}{1620} = 6 \quad f(6) = 88\left(\frac{1}{2}\right)^6$

≈ 1.375 grams

4pt 10. A certain strain of bacteria that is growing on your kitchen counter doubles every 6 minutes. Assuming there are 10 bacteria when you first notice the bacteria present, determine the number of bacteria that will likely be present at the end of an hour and 48 minutes. You must show work to receive full credit.

$f(x) = 10(2)^x \quad \frac{108}{6} = 18 \quad f(18) = 10(2)^{18}$

$\approx 2,621,440$

3pt 11. Your fish tank contained 45 gallons when it was completely full. Since you filled the tank, water has evaporated so that there are now only 32.5 gallons of water. By what % did the water volume decrease? You must show work to receive full credit.

$\frac{\text{change}}{\text{original}} = \frac{45-32.5}{45} = \frac{12.5}{45} \approx 0.2\overline{7} \approx 27.\overline{7}\%$

5pt 12. An exponential function contains the two points $(2,12)$ & $(3,72)$. Determine an equation for this function. Determine the y-value when $x = 4$.

from 12 to 72 we multiply by 6 $\quad b = 6$

x	0	1	2	3
y	$\frac{1}{3}$	2	12	72

$a = \frac{1}{3}$

$f(x) = \frac{1}{3}(6)^x \quad f(4) = \frac{1}{3}(6)^4$

$= 432$

5pt 13. An exponential function contains the two points $(0,2)$ & $\left(3,\frac{1}{32}\right)$. Determine an equation for this function. Determine the y-value when $x=-1$.

$f(x)=a(b)^x \quad f(x)=2(b)^x$

0	1	2	3
2	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{32}$

$b=\frac{1}{4}$

$f(x)=2\left(\frac{1}{4}\right)^x$

$f(-1)=2\left(\frac{1}{4}\right)^{-1}=2(4)=8$

4pt 14. Circle all the functions that represent exponential decay:

a. $f(x)=\frac{1}{2}(0.99)^x$ b. $f(x)=7\left(\frac{8}{9}\right)^x$ c. $f(x)=18\left(\frac{4}{5}\right)^{-x}$ d. $f(x)=0.8(4)^x$

4pt 15. Circle all the functions that represent exponential growth:

a. $f(x)=\frac{6}{7}(1.009)^x$ b. $f(x)=0.02\left(\frac{11}{6}\right)^x$ c. $f(x)=3\left(\frac{5}{4}\right)^{-x}$ d. $f(x)=\frac{1}{8}\left(\frac{10}{9}\right)^x$

4pt 16. Suppose $f(x)=(5.5)^x$ is a parent function. A transformation of $f(x)=(5.5)^x$ is created by stretching the graph of $f(x)$ vertically by a factor of 3 and shifting 2 units to the left. An equation for the transformed graph is

a. $k(x)=2(5.5)^{3x}$ b. $k(x)=(5.5)^{3x}-2$

c. $k(x)=3(5.5)^{x+2}$ d. $k(x)=3(5.5)^{x-2}$

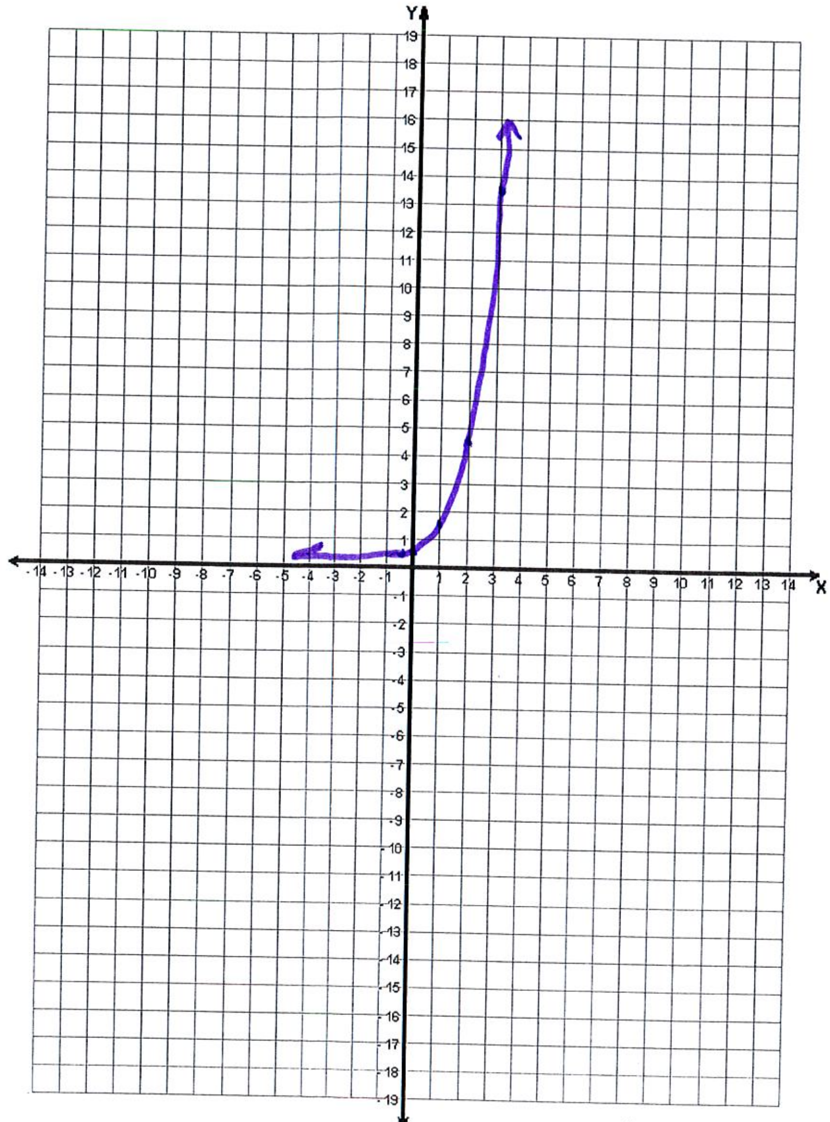
3pt 17. Suppose $f(x)=\left(\frac{1}{3}\right)^x$ is a parent function. Write a clear and concise description of the transformation from $f(x)=\left(\frac{1}{3}\right)^x$ to $K(x)=\left(\frac{1}{3}\right)^{x+5}$

f(x) is shifted 5 units to the left.

6pt

18. Given the exponential function $f(x)=\frac{1}{2}(3)^x$, fill in the x-y table, plot the points carefully and draw the GRAPH neatly.

x	y
-2	$\frac{1}{18}$
-1	$\frac{1}{6}$
0	$\frac{1}{2}$
1	$\frac{3}{2}=1.5$
2	$\frac{9}{2}=4.5$
3	$\frac{27}{2}=13.5$



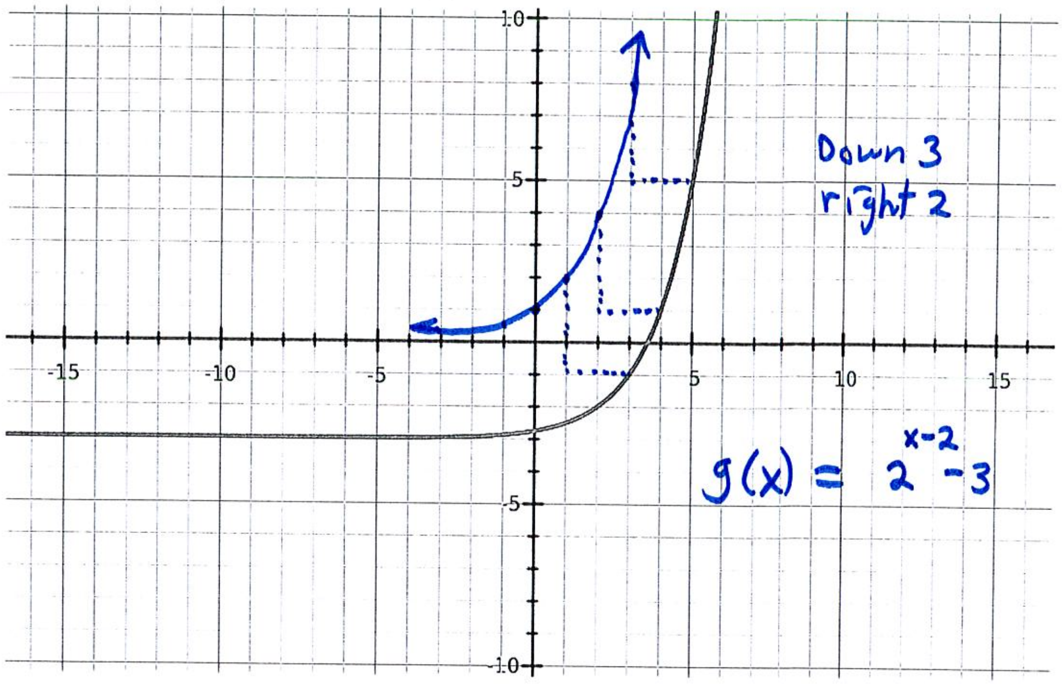
3pts

19. Given the function $f(x)=\frac{1}{2}(3)^x$ in # 18 above, will the value of y or $f(x)$ reach zero? If so, what is the value of x for which $y=0$? If not, explain why the value of y will not reach $y=0$. Explain your answer clearly.

y will not reach zero since there is not value of x that turns 3^x into zero.

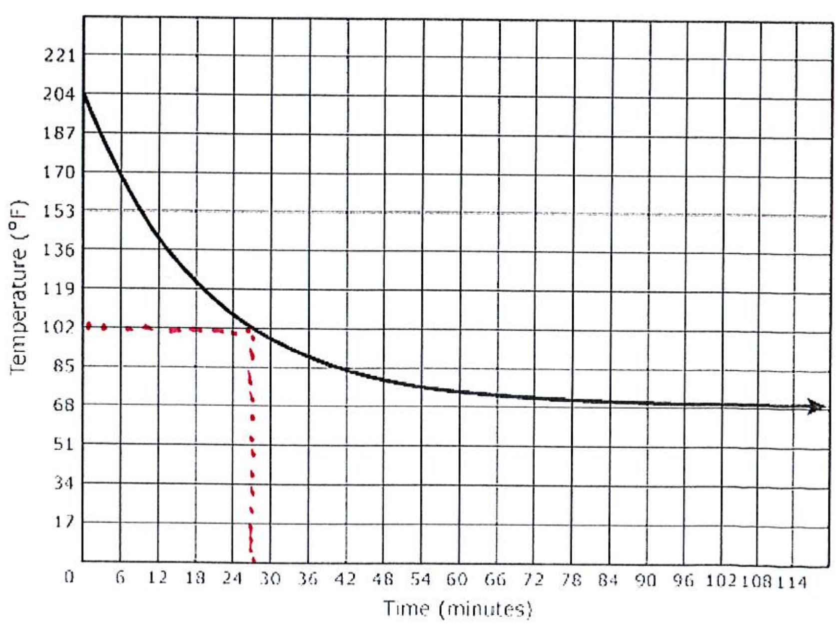
4pt

20. Given the parent function $f(x) = (2)^x$, function $g(x)$ results from a transformation of function $f(x) = (2)^x$. A portion of the transformation graph $g(x)$ is shown below. What is an equation of $g(x)$?



Use the graph below to answer questions 21 – 24.

The graph below represents the temperature, in degrees Fahrenheit (°F), of tea for the first 120 minutes after it was boiled and poured into a cup.



3pt 21. Based on the graph, what was the temperature of the tea when it was first poured into the cup?

a. 68°
b. 114°
c. 136°
d. 204°

3pt 22. Based on the graph, as the number of minutes increased, what temperature did the tea approach?

a. 68°
b. 114°
c. 136°
d. 204°

3pt 23. Based on the graph, how after how many minutes was the tea half as hot as it was when first poured into the cup?

a. 8 minutes
b. 28 minutes
c. 88 minutes
d. 108 minutes

3pt 24. Why will the tea not get any cooler than approximately 68°?

Liquid cools to the ambient temperature and does not get cooler than that.